

Applicant : Nikil Dutt et al.
Appl. No. : 10/599,593
Examiner : Jue S Wang
Docket No. : 703538.4054

Amendments to the Claims

This listing of claims will replace all prior versions and listings of claims in the application:

1. (Currently Amended) A method of simulating an instruction set architecture (ISA) with a instruction set simulator (ISS), comprising:

generating a template of a plurality of templates, each template configured to implement a functionality of an instruction contained within an instruction class, the instruction class describing a set of instructions of the instruction set architecture having a common behavior;

reducing a set of original instructions of a target application program to a subset of the plurality of templates, wherein each template of the subset of templates is customized by using parameters contained within an original instruction of the set of original instructions;

optimizing the subset of templates by compiling the subset of templates into a decoded program, each decoded instruction of the decoded program associated with a customized template;

fetching a decoded instruction of the decoded program during a run time,
~~wherein the decoded instruction is decoded from an original instruction in a target application program during a compile time preceding the run time, the decoded instruction pointing to a template configured to implement the functionality of the original instruction, wherein the template is associated with an instruction class that describes a set of instructions of the instruction set architecture having a common behavior, wherein the original instruction is contained in the instruction class;~~

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determining whether the decoded instruction fetched during a run time is modified from the original instruction; and

executing the customized template if the decoded instruction was not modified from the original instruction.

2. (Previously Presented) The method of claim 1, further comprising decoding the original instruction by selecting the template corresponding to the original instruction and customizing the template based on the data in original instruction prior to fetching the decoded instruction.

3. (Previously Presented) The method of claim 2, wherein the template has a corresponding mask usable to identify instructions belonging to the instruction class.

4. (Original) The method of claim 3, wherein selecting a template comprises:

comparing the original instruction to the mask corresponding to the template;
and

selecting the template if the mask matches the original instruction.

5. (Original) The method of claim 2, wherein customizing the template comprises determining a value of a parameter in the template based on the data in the original instruction.

6. (Previously Presented) The method of claim 3, wherein customizing the template comprises determining a value of a parameter in the template based on the data in the original instruction.

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7. (Original) The method of claim 6, further comprising compiling a first program comprising the customized template in the compile time.

8. (Original) The method of claim 7, further comprising optimizing the template during the compile time.

9. (Original) The method of claim 1, further comprising:
re-decoding the fetched instruction during the run time if the fetched instruction was modified, wherein the re-decoded instruction designates a function configured to implement the functionality of the instruction; and
executing the designated function if the instruction was modified.

10. (Original) The method of claim 1, further comprising executing the modified instruction using an interpretive process.

11. (Original) The method of claim 8, further comprising compiling the target application program to generate the original instruction.

12. (Currently Amended) A system, comprising:
a processor; and
a computer readable medium having stored thereon a generic instruction model, the generic instruction model executable by the processor in an instruction set simulator, the generic instruction model comprising an instruction specification usable to interpret each instruction in an ISA, the instruction specification comprising one or more operation classes;

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wherein each operation class defines a set of one or more instructions, the operation class having an operation mask usable to identify instructions belonging to the class; and

~~further~~ wherein the operation class comprises one or more symbols and an expression describing the class in terms of the one or more symbols, each symbol having a corresponding set of one or more symbol types; each symbol type in the set comprising information usable to determine the symbol when compared to an instruction; and

wherein the instruction set simulator is configured to perform

generating a template of a plurality of templates, each template configured to implement a functionality of an instruction contained within an instruction class, the instruction class describing a set of instructions of the instruction set architecture having a common behavior;

reducing a set of original instructions of a target application program to a subset of the plurality of templates, wherein each template of the subset of templates is customized by using parameters contained within an original instruction of the set of original instructions;

optimizing the subset of templates by compiling the subset of templates into a decoded program, each decoded instruction of the decoded program associated with a customized template;

fetching a decoded instruction of the decoded program during a run time, ~~wherein the decoded instruction is decoded from an original instruction in a target application program during a compile time preceding the run time, the decoded instruction~~

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~~pointing to a template configured to implement the functionality of the original instruction,
wherein the template is associated with an instruction class that describes a set of
instructions of the instruction set architecture having a common behavior, wherein the
original instruction is contained in the instruction class;~~

determining whether the decoded instruction fetched during a run time is
modified from the original instruction; and

executing the customized template if the decoded instruction was not
modified from the original instruction.

13. (Previously Presented) The system of claim 12, wherein the set of
instructions has a common behavior and the expression defines the behavior of the class in
terms of the one or more symbols.

14. (Previously Presented) The system of claim 12, wherein one
symbol type in the type set is an constant type.

15. (Previously Presented) The system of claim 14, wherein the type
set comprises a plurality of constant types, each constant type having a corresponding type
mask usable to determine the constant when compared to an instruction.

16. (Previously Presented) The system of claim 12, wherein one
symbol type in the type set is a register type.

17. (Previously Presented) The system of claim 16, wherein the
register type comprises a register index and a register class.

18. (Previously Presented) The system of claim 12, wherein one
symbol type in the type set is an operation type.

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19. (Previously Presented) The system of claim 18, wherein the type set comprises a plurality of operation types, each operation type having a corresponding type mask usable to determine the operation when compared to an instruction.

20. (Previously Presented) The system of claim 12, wherein at least one operation class comprises a plurality of expressions, each expression being conditional on data within an instruction.

21. (Previously Presented) The system of claim 12, wherein each instruction comprises a series of slots, each slot comprising data translatable into an operation.

22. (Previously Presented) The system of claim 12, wherein each instruction comprises a series of binary data values and the operation mask comprises a series of mask positions wherein each mask position corresponds to one instance of a binary data value.

23. (Previously Presented) The system of claim 12, wherein each mask position has a value selected from a group comprising: a binary one value, a binary zero value and a do not care value.

24. (Currently Amended) A computer readable medium having stored thereon a set of instructions executable by a machine to perform operations for simulating an instruction set architecture (ISA), said operations comprising:

generating a template of a plurality of templates, each template configured to implement a functionality of an instruction contained within an instruction class, the

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instruction class describing a set of instructions of the instruction set architecture having a common behavior;

reducing a set of original instructions of a target application program to a subset of the plurality of templates, wherein each template of the subset of templates is customized by using parameters contained within an original instruction of the set of original instructions;

optimizing the subset of templates by compiling the subset of templates into a decoded program, each decoded instruction of the decoded program associated with a customized template;

fetching a decoded instruction of the decoded program during a run time;
~~wherein the decoded instruction is decoded from an original instruction in a target application program during a compile time preceding the run time, the decoded instruction pointing to a template configured to implement the functionality of the original instruction, wherein the template is associated with an instruction class that describes a set of instructions of the instruction set architecture having a common behavior, wherein the original instruction is contained in the instruction class;~~

determining whether the decoded instruction fetched during a run time is modified from the original instruction; and

executing the customized template if the decoded instruction was not modified from the original instruction.

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25. (Original) The computer readable medium of claim 24, wherein the template corresponds to a first class of one or more instructions and wherein the template has a corresponding mask usable to identify instructions belonging to the first class.

26. (Original) The computer readable medium of claim 24, further comprising:

re-decoding the fetched instruction during the run time if the fetched instruction was modified, wherein the re-decoded instruction designates a function configured to implement the functionality of the instruction; and

executing the designated function if the instruction was modified.

27. (Original) The computer readable medium of claim 24, further comprising executing the modified instruction using an interpretive process.